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EXAMINER
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KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 08/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/715,575

Applicant(s)

GREYWALL, DENNIS S.

Examiner

Chih-Cheng Glen Kao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 March 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) 2,6,17 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group I, claim 1-21 in Paper No. 6 is acknowledged. Claims 22-26 have been canceled accordingly as directed in Paper No. 6.

### ***Information Disclosure Statement***

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

### ***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

Fig. 11, #732

Fig. 12, #724

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

*Claim Objections*

4. Claims 2, 6, and 17 are objected to because of the following informalities, which appear to be minor grammatical errors: (claim 2, line 1, “at a first layer”), (claim 6, lines 1-2, “surface is that it is reflective”), (claim 17, line 4, “each one optical waveguide), and (claim 17, line 8, “each one optical waveguide”).

These objections may be obviated by using the following respective suggestions: (claim 2, line 1, deleting “at”), (claim 6, lines 1-2, deleting “that it is”), (claim 17, line 4, deleting “one”), and (claim 17, line 8, deleting “one”).

Appropriate correction is required.

5. Claim 18 is objected to because of the following informalities, which appear to be minor draft errors that have created lack of antecedent basis problems: (claim 18, line 2, “said optical waveguides”) and (claim 18, line 3, “said optical waveguides”). The recitation, “said optical waveguides”, refers to two different elements in claim 17.

The following respective suggestions may obviate the objections: (claim 18, line 2, inserting - -first array of” - - after “said”) and (claim 18, line 3, inserting - -second array of- - after “said”).

For purposes of examination, the claim will be treated as such. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Daneman et al. (US Patent 6586841)

Daneman et al. discloses an article (Fig. 4A and 4B) comprising: a multi-layer substrate (Fig. 4A, #402 and 414), a support portion defined from and rotatably coupled to (Fig. 4B, #416) the substrate, and an element portion (Fig. 4B, #400), coupled to the support and movable between a first position within the multi-layer substrate below an exterior surface and a second position outside the substrate above the exterior surface (Figs. 4A and 4B).

7. Claims 1-4 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Munoz-Bustamante et al. (US Patent 6415070).

8. With regards to claim 1, Munoz-Bustamante et al. discloses an article (Figs. 3c and 4) comprising: a multi-layer substrate (Fig. 4, #42-45), a support portion (Fig. 4, #45) defined from and rotatably coupled to the substrate, and an element portion (Fig. 4, end of #45) movable between a first position below an exterior surface and a second position outside the exterior surface of the substrate (Fig. 4).

9. With regards to claim 2, Munoz-Bustamante et al. further discloses a first (Fig. 3c, #44), second (Fig. 3c, #42), and intermediate layer (Fig. 3c, #43).

10. With regards to claim 3, Munoz-Bustamante et al. further discloses the support comprising a torsional member rotatably coupled to the substrate (Fig. 3c, #45).

11. With regards to claim 4, Munoz-Bustamante et al. further discloses the support comprising a beam (col. 3, line 37) with the element portion depending from the beam (Fig. 4).

12. With regards to claim 11, Munoz-Bustamante et al. further discloses an actuating plate (Fig. 4, portion collecting negative charge under #45) depending from the beam, and an electrode in spaced relation (Fig. 4, #51), wherein under the action of an applied potential difference (Fig. 4, positive and negative charges), the electrode causes the actuating element to move towards the second layer (Fig. 4, #42), which causes an element to move towards the second position (Fig. 4, right side of #45).

13. Claims 14 is rejected under 35 U.S.C. 102(e) as being anticipated by Goodwin-Johansson (US Patent 6236491).

Goodwin-Johansson discloses an article (Fig. 3) comprising: a support portion defined from a first layer of multi-layer substrate (Fig. 3, #60) and an element portion (Fig. 3, #62) defined from a second layer of the substrate, wherein, an interior of the substrate is defined from

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a top surface of the first layer and a bottom surface of the second layer (Fig. 3, peak of #40), and the element portion comprises a part of the second layer (Fig. 3, #62) wherein the element is movable between a first position in said interior of the substrate (Fig. 3, valley of #62) and a second position above the top surface (Fig. 3, peak of #62).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daneman et al. as applied to claim 1 above.

15. With regards to claim 2, Daneman et al. discloses a device as recited above. Daneman et al. further discloses a multi-layer substrate with a first and second layer (Fig. 4A, #402 and 414).

However, Daneman et al. does not specifically disclose an intermediate layer.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have an intermediate layer with the device of Daneman et al., since MEMS devices are well known to have multiple layers used for various functions. In this case, one would be motivated to have an intermediate layer, such as an adhesive layer, between the two layers to prevent the device from falling apart.

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16. With regards to claim 3, Daneman et al. further discloses the support comprising a torsional member rotatably coupled to the substrate (Figs. 4A and 4B).

17. With regards to claim 4, Daneman et al. discloses a device as recited above.

However, Daneman et al. does not disclose a support beam in this embodiment.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have a support beam with the suggested device of Daneman et al., since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. One would be motivated to use a beam to keep the size of components small and save space when dealing with MEMS.

18. With regards to claim 5, Daneman et al. further discloses a working surface of the element portion adapted to receive an optical signal (col. 5, lines 55-60).

19. With regards to claim 6, Daneman et al. further discloses a reflective working surface substantially orthogonal to the exterior surface of the substrate (Figs. 4A and 4B).

20. Claims 12, 13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Munoz-Bustamante et al. as respectively applied to claim 11 above, and further in view of Lin (US Patent 5960132).



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21. With regards to claims 12 and 13, Munoz-Bustamante et al. discloses a device as recited above.

However, Munoz-Bustamante et al. does not disclose an optical cross connect having a first and second waveguide orthogonal to each other, wherein, when the element is in a first position, the waveguide are in communication, and when the element is in a second position, the waveguides are not in communication.

Lin teaches an optical cross connect (Fig. 1) having a first (Fig. 1, #26a) and second (Fig. 1, #26d) waveguide orthogonal to each other, wherein, when the element is in a first position, the waveguide are in communication, and when the element is in a second position, the waveguides are not in communication (Fig. 1, #4).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have an optical cross connect with the waveguides and element positions of Lin with the device of Munoz-Bustamante et al., since one would be motivated to incorporate it for free-space optical switches to provide modem communications as shown by Lin (col. 1, lines 16-42).

22. With regards to claim 17, for purposes of being concise, Munoz-Bustamante et al. in view of Lin suggests a device as recited above. Munoz-Bustamante et al. further discloses an array of  $n \times n$  optical elements (Fig. 2), an element portion defined from at least one layer of the substrate (Fig. 3c, #45).

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However, Munoz-Bustamante et al. does not disclose a first and second array of  $1 \times n$  optical waveguides, nor an element portion having an optical signal receiving signal surface orthogonal to a major surface.

Lin teaches a first and second array of  $1 \times n$  optical waveguides (Fig. 1) and an element portion having an optical signal receiving signal surface orthogonal to a major surface (Fig. 4).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the waveguides of Lin with the device of Munoz-Bustamante et al., since one would be motivated to incorporate it for free-space optical switches to provide modem communications as shown by Lin (col. 1, lines 16-42).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have orthogonal relationship of Lin with the device of Munoz-Bustamante et al., since one would be motivated to incorporate it to provide a switching mechanism for transferring signals in modem communications as shown by Lin (col. 1, lines 16-42).

23. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodwin-Johansson.

24. With regards to claim 1, Goodwin-Johansson discloses an article (Fig. 3) comprising: a multi-layer substrate (Fig. 3, #62 to 10), a support portion defined from and rotatably coupled to (Fig. 3, #60) the substrate, and an element portion (Fig. 3, #62), coupled to the support and

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movable between a first position within the multi-layer substrate and a second position outside the substrate above the exterior surface (Figs. 8).

However, Goodwin-Johansson does not specifically disclose the first position below an exterior surface.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have first position below an exterior surface with the device of Goodwin-Johansson, since such a modification would have only involves rearranging parts of an invention which only involves routine skill in the art. One would be motivated to have the element in a first position below the exterior surface to ensure that no light is reflected, which can be implied from Figure 8.

25. With regards to claim 2, Goodwin-Johansson further discloses the substrate with a first (Fig. 1, #60), second (Fig. 1, #62) and intermediate (Fig. 1, #40) layer.

26. With regards to claim 3, Goodwin-Johansson further discloses the support comprising a torsional member (Figs. 1 and 8).

27. With regards to claim 4, Goodwin-Johansson suggests a device as recited above.

However, Goodwin-Johansson does not disclose a support beam.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have a support beam with the suggested device of Goodwin-Johansson, since such a modification would have involved a mere change in the size of a component. A

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change in size is generally recognized as being within the level of ordinary skill in the art. One would be motivated to use a beam to direct only a small fraction of the light needed (Fig. 8) in a different direction for better signal discrimination.

28. Claim 5-8, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodwin-Johansson as respectively applied to claims 4 and 14 above, and further in view of Lin.

29. With regards to claims 5 and 6, Goodwin-Johansson suggests a device as recited above.

However, Goodwin-Johansson does not disclose a working reflective surface receiving an optical signal, and further wherein the working surface is disposed in orthogaonl relation to the exterior surface.

Lin teaches a working reflective surface receiving an optical signal, and further wherein the working surface is disposed in orthogaonl relation to the exterior surface (Fig. 5 and 9).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the orthogonal working surface receiving an optical signal of Lin with the device of Goodwin-Johansson, since one would be motivated to incorporate it for free-space optical switches to provide modem communications as shown by Lin (col. 1, lines 16-42).

30. With regards to claim 7, Goodwin-Johansson further discloses the torsional member comprising a part of the first layer (Fig. 1, #60) and the element portion comprising a part of the second layer (Fig. 1, #62).

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31. With regards to claim 8, Goodwin-Johansson further discloses the height of the working surface defined by the thickness of the second layer (Fig. 1, #62).

32. With regards to claim 15, Goodwin-Johansson discloses a device as recited above.

However, Goodwin-Johansson does not disclose a working surface receiving an optical signal, and further wherein the working surface is disposed in orthogaonl relation to the exterior surface.

Lin teaches a working surface receiving an optical signal, and further wherein the working surface is disposed in orthogaonl relation to the exterior surface (Fig. 5 and 9).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the orthogonal working surface receiving an optical signal of Lin with the device of Goodwin-Johansson, since one would be motivated to incorporate it for free-space optical switches to provide modem communications as shown by Lin (col. 1, lines 16-42).

33. With regards to claim 16, Goodwin-Johansson further discloses the working surface defined by a thickness of the second layer (Fig. 3, #62).

34. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodwin-Johansson in view of Lin as applied to claim 8 above, and further in view of Bernstein (US Patent 6388789).

With regards to claims 9 and 10, Goodwin-Johansson suggests a device as recited above.

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However, Goodwin-Johansson does not disclose layers comprising silicon and an insulation layer.

Bernstein teaches layers comprising silicon and an insulation layer (col. 4, lines 1-5).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have include silicon and an insulation layer of Bernstein with the suggested device of Goodwin-Johansson in view of Lin, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. One would be motivated to use silicon for its ease of use with integrated circuit manufacturing processes (Goodwin-Johansson: col. 6, lines 35-40) and micro-machining as implied from Bernstein (col. 4, lines 1-5).

Secondly, it would have been an obvious matter of design choice to have thick or thin layer, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. One would be motivated to have a thick layer for more strength of a layer or a thin layer for more compactness.

35. Claims 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munoz-Bustamante et al. in view of Lin as applied to claim 17 above, and further in view of Ao (US Patent 6411753).

Munoz-Bustamante et al. in view of Lin suggests a device as recited above.

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However, Munoz-Bustamante et al. does not disclose collimating/focusing lenses to collimate signals leaving the first array of waveguides and to focus signals entering the second array of waveguides.

Ao teaches collimating/focusing lenses (Fig. 1, #3 and 6) to collimate signal leaving the first array of waveguides and to focus the signals entering the second array of waveguides (col. 2, lines 31-37).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the lenses of Ao with the suggested device of Munoz-Bustamante et al. in view of Lin, since one would be motivated to incorporate these for minimizing coupling loss as implied from Ao (col. 1, lines 32-63).

36. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Munoz-Bustamante et al. in view of Lin as applied to claim 17 above, and further in view of Bernstein.

Munoz-Bustamante et al. in view of Lin suggests a device as recited above.

However, Munoz-Bustamante et al. does not disclose a substrate comprising an soi wafer with a thick silicon layer, oxide, and a thin silicon layer on the oxide.

Bernstein teaches an soi wafer as known material in the art (col. 4, lines 2-3) with silicon and oxide (col. 5, lines 40-50).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have include a substrate comprising a known material such as soi wafer of Bernstein with the suggested device of Munoz-Bustamante et al. in view of Lin, which is explained with motivation as follows.

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It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have an soi wafer as the substrate, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. One would have been motivated to use an soi wafer for ease of etching, ease of micro-machining, ease of manufacturing, and relative strength in durability, among the few motivations.

Lastly, it would have been an obvious matter of design choice to have thick or thin layer, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. One would be motivated to have a thick layer for more strength of a layer or a thin layer for more compactness.

37. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munoz-Bustamante et al. in view of Lin and Bernstein as applied to claim 20 above, and further in view of Burns (US Patent Application 2001/0046346).

Munoz-Bustamante et al. in view of Lin and Bernstein suggests a device as recited above.

However, Munoz-Bustamante et al. does not disclose a working surface having a <111> crystal orientation.

Burns teaches a working surface having a <111> crystal orientation (Page 1, Paragraph 8).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the <111> orientation of Burns with the suggested device of



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Munoz-Bustamante et al. in view of Lin and Berstein, since one would be motivated to have the <111> orientation to provide a wall to obstruct or reflect light in a switch as implied from Burns (Page 1, Paragraph 8).


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (703) 605-5298. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (703) 308-4858. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
gk  
8/22/03

  
DAVID V. BRUCE  
PRIMARY EXAMINER